ITE Technical Committee TENC-105-01: School Site Planning, Design and Transportation

ROAD USER SAFETY IN AND AROUND SCHOOL AREAS IS A HIGHLY SENSITIVE SUBJECT. MANY TRAFFIC PROBLEMS HAVE OCCURRED DUE TO THE LACK OF GOOD GUIDANCE AVAILABLE TO LOCAL JURISDICTIONS AND SCHOOL OFFICIALS RESPONSIBLE FOR SELECTING SCHOOL SITES AND BUILDING SCHOOLS. ITE TECHNICAL COMMITTEE TENC-105-01 WAS ESTABLISHED TO IDENTIFY GUIDELINES OR BEST PRACTICES FOR SCHOOL SITE PLANNING, DESIGN AND TRANSPORTATION FACILITIES.

BY MICHAEL J. CYNECKI, P.E. AND RUSSELL G. BROWNLEE, P.ENG.

INTRODUCTION

Road user safety in and around school areas is a highly sensitive subject among the public, school officials and local officials. Many of the traffic problems at schools are related to the lack of good guidelines for selecting optimal sites where schools are to be built; improper design of the school campus; and poor connectivity to the neighborhood the school serves.

The Institute of Transportation Engineers (ITE) recognized this problem and established a technical committee to address it. This feature provides a summary of the activities of ITE Technical Committee TENC-105-01 to identify desirable or recommended practices for school site planning, design and transportation facilities.

Over the years, there has been a phenomenon of fewer children walking or bicycling to school along with increased traffic problems at schools. In 1969, about half of all students walked to school. The 2001 National Household Travel Survey found that fewer than 15 percent of all school trips were made by walking or bicycling, one-quarter were made by school bus and more than half of children arrived at school in private automobiles.[1,2]

This trend is relatively common across North America. There are many reasons, including the trend to larger schools and poor placement of schools, among others. The increase in parents driving their children to school is one of the major factors creating air quality problems and traffic problems at schools and is a contributing factor to the childhood obesity epidemic.

The goal of the ITE Technical Committee is to develop a set of guidelines that can be used by local agencies, school officials, developers and others to identify and provide safe and highly functional school sites; provide guidelines on the layout of school campuses and street systems adjacent to schools; and provide adequate sidewalk/bikeway connections to maximize the ability of students to walk or ride their bikes to school.

The guidelines will primarily focus on conventional public schools, especially elementary and middle schools (kindergarten to eighth grade), but they also will contain information for high schools, charter schools and parochial/private schools. A major emphasis will be on the site selection and design of new elementary schools for maximum walkability, safety and efficiency. Information also will be provided for the redevelopment of existing school sites for greater walkability and safety and improved traffic efficiency.

The guidelines are intended to be used by school administrators and school board representatives, developers, land use planners, architects, transportation planners, transportation engineers and state/provincial and local politicians.

NATIONAL SAFE ROUTES TO SCHOOL LEGISLATION

The U.S. Congress has given high priority to school transportation safety and encouraging more children to walk to school. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation provided funding of $612 million over 5 fiscal years (2005–2009) to be administered by state departments of transportation for Safe Routes to School (SRTS) projects. Funding is provided to the states to improve the ability of primary and middle school students to walk and bike to school safely. The purpose of the program is to:[3]

- enable and encourage children, including those with disabilities, to walk and bicycle to school;
- make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging healthy and active lifestyles from an early age; and

- facilitate the planning, development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption and air pollution in the vicinity of primary and middle schools.

Projects must be within 2 miles of the school to be eligible for program funding, and states are to manage the program and apportion the funds within federal guidelines. Each state is to have a full-time SRTS coordinator to administer programs. Infrastructure projects (typically engineering improvements) are to comprise 70 to 90 percent of the annual funding; non-infrastructure-related activities (typically education, enforcement and encouragement programs) are to receive 10 to 30 percent of the annual funding within a state.

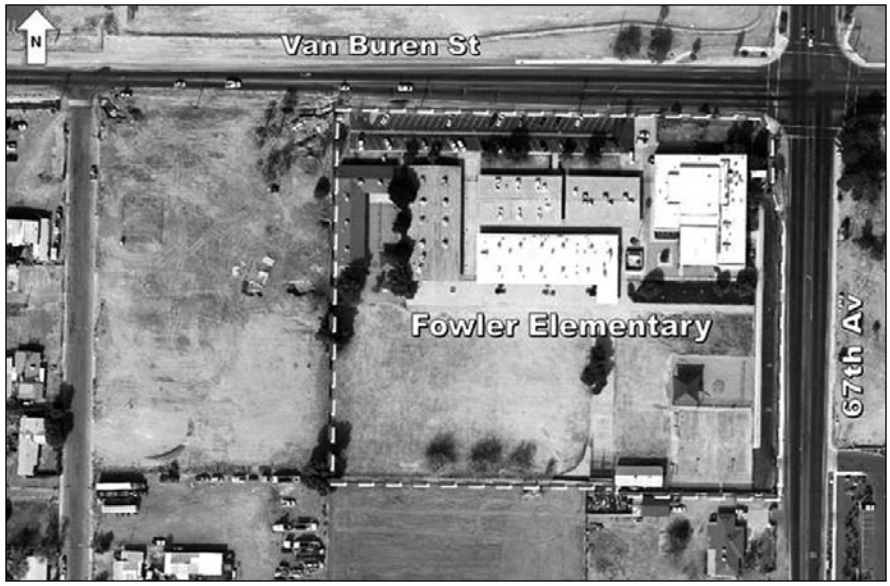

Figure 1. Fowler Elementary School was originally established at the intersection of 67th Avenue and Van Buren Street in 1896. Both streets are now so congested and wide that school officials decided to bus all students to school.

MAJOR ISSUES AT SCHOOLS

A number of factors have led to the reduction in walking and the increased congestion and traffic problems at schools. Some problems are created by schools established long ago at poor locations requiring students to cross busy streets. Some factors are related to local ordinance requirements that had good intentions but resulted in unintended negative consequences. Other problems result from the desire to reduce the cost of purchasing land and building new schools.

Low-cost location, design and construction of a school with inadequate infrastructure can result in a lifetime of higher costs for traffic control or busing to overcome built-in traffic safety and operational problems. Because schools will be in service for many years, it is important to understand how a school will operate with respect to the adjacent community and roadway system (see Figure 1).

Specific issues that result in decreased walking/bicycling and added traffic problems include:

- Increased school size: Years ago, typical elementary schools were smaller, with an average population of 127 students. Today, the average size of a school is 653 students, and elementary schools of 800 to 1,000 students are not uncommon.[4] Larger school populations typically mean larger attendance boundaries with longer walking distances, which discourages walking and creates traffic problems.
- Increased school campus size requirements: Some agencies, through zoning ordinances, are requiring larger school campus sizes, forcing school officials to select poor sites and locate the school campus farther away from the neighborhoods they serve. Smaller schools sizes should result in a smaller school campus, providing more options for the location of the school.
- School placement within the attendance boundary: Schools should be located in the center of the attendance boundary to minimize walking distances, and elementary schools should not front onto busy arterial streets. Furthermore, young children should not have to cross busy, high-speed arterial streets to walk to school. High schools, on the other hand, are typically more appropriate for arterial street locations due to the higher traffic levels generated by these schools. Access to the school campus should occur from more than one driveway, and major driveways should be carefully located to avoid left-turn conflicts with driveways and intersections on the opposite side of the street. Major school driveways on arterial streets should be located at potential traffic signal points to allow for possible traffic signal control. Figure 2 illustrates an example where four schools were combined onto one large campus and were not located inside the neighborhoods. This discourages and largely prevents walking or bicycling, which is not desirable.
- Traffic circulation and connectivity within the neighborhood: Schools should not be located at the ends of cul-de-sacs and should have vehicle access from at least two different streets, preferably more. More points of access will result in less congestion and more efficient traffic dispersion. Pedestrian and bike access should occur from all points around the school, and walking distances should be minimized. Neighborhoods with cul-de-sacs and minimal connectivity will provide poor pedestrian/bike access to schools and minimize walking. A grid neighborhood layout will provide the best connectivity between the school and the community it serves, allowing more children to walk or bike to school.
- Lack of sidewalks: Paths and sidewalks are "highways" for pedestrians. All-weather paved walkways and sidewalks are needed to provide pedestrians a safe place to walk and will encourage parents to allow their children to walk to school. Wider sidewalks are needed at or near school grounds, and there should be adequate connections from

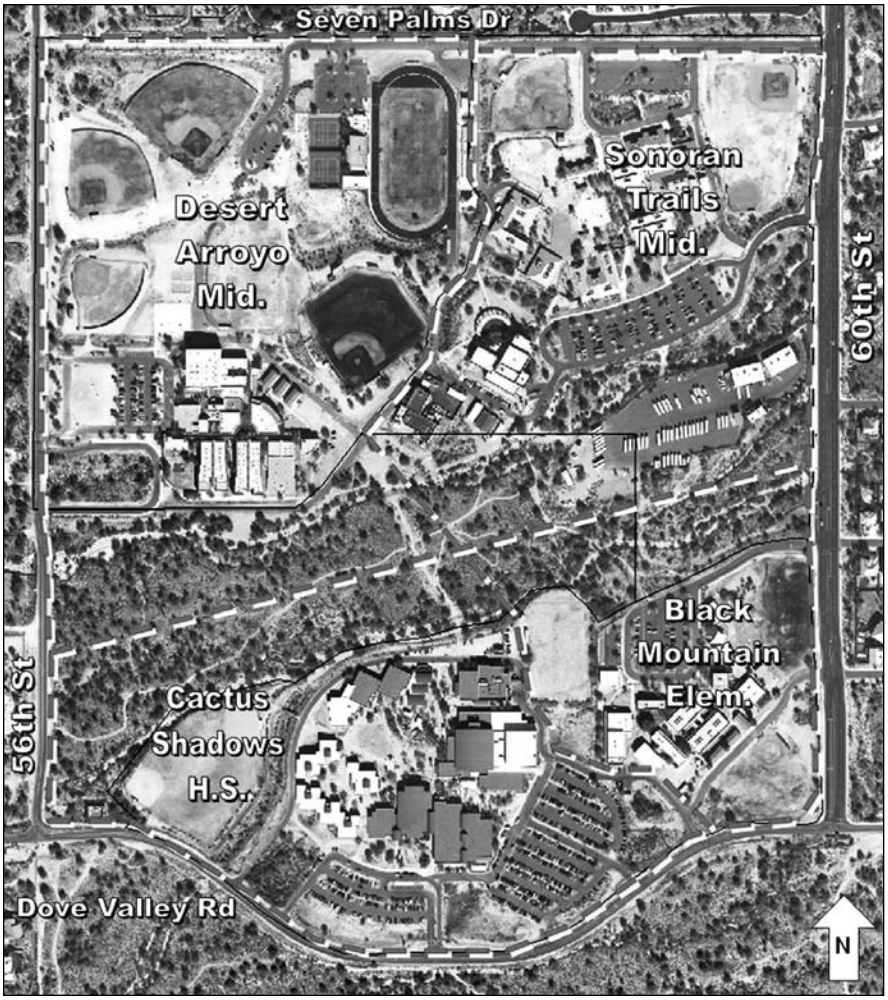

Figure 2. The Cave Creek Unified School District built one elementary school, two middle schools and a high school on the same one-half square-mile parcel of land in an effort to minimize maintenance and land costs. Unfortunately, few students are able to walk or bike to school.

the sidewalks to the school buildings with minimal driveway crossings. In addition, street crossings need to be evaluated for appropriate traffic control. Adult crossing guards may be needed where young children cross busy streets to provide for optimal safety and efficiency.

- Inadequate pick-up and drop-off areas for school buses and parents: Separate pick-up/drop-off areas should be provided for school buses and for parents. Pick-up/drop-off plans should be implemented for efficient operation and to minimize traffic congestion and back-up on the adjacent street system. Ample queuing areas are needed on the school campus or along the school so that pick-up and drop-off will not disrupt flow in the adjacent streets.
- Inadequate curb space: Schools should not front onto a single street, which will focus all of the traffic into one small area and minimize available room for parking and pick-up/drop-off activities. Schools should front onto at least two streets and, preferably, more.
- Inadequate parking: Schools need ample parking for staff, parents and other visitors and to discourage parking intrusion into adjacent neighborhoods. High schools should provide ample on-campus parking for students and discourage as many students as possible from driving to school. Parking also must accommodate other school activities such as parent-teacher conferences, open houses, sporting events and concerts.
- Parent attitudes: Concerns about child abductions (which are largely unfounded), adverse weather conditions, or road user safety often discourage parents from allowing their children to walk or bike to school, adding to the traffic congestion at school arrival and dismissal times.
- School security concerns: Security concerns often result in closed campuses with very few access points. Fewer access points often create more congestion at the remaining access points and longer walking distances, which discourages walking. There needs to be a balance between campus security and school access. Remote campus access points can be allowed during school arrival and dismissal but may be locked during other times.
- Teenage drivers at high schools: Teenage drivers are the least experienced drivers and are more prone to crashes and unsafe driving behaviors. Due to the increased affluence of our society and the car as a status symbol, too many teenagers are driving to school and too many parents are driving their children to school. Behavioral changes are needed to accompany the physical changes to improve the school and community infrastructure.

EXAMPLES OF A GOOD SCHOOL SITE AND CAMPUS LAYOUT

There are many good and poor examples of school sites with respect to road user safety, which facilitates or discourages walking. Many of the poor school site examples involve schools that were built along arterial streets long ago when traffic volumes were much lower and streets were narrower. Other poor school sites are the result of developers designating a poor or largely inaccessible parcel of land within their development for the school campus. On occasion, the least marketable parcel within the development is set aside for the school campus.

Mirage Elementary School in Phoenix, AZ, USA, illustrates a desirable school site and campus layout and connectivity to the neighborhood (see Figure 3). This school is located almost in the center of a 1 square-mile attendance boundary, at the intersection of two collector streets. It is a nearly

Figure 3. The Mirage Elementary School campus in Phoenix, AZ, USA.

Figure 4. Christa McAuliffe Elementary School in Lenexa, KS, USA.

Figure 5. Moon Mountain Elementary School campus in northwest Phoenix, AZ, was rebuilt to front inside the neighborhood.

100-percent walking school (except for special education students), and children do not have to cross a busy or wide arterial street. It fronts onto two collector streets (39th Avenue and Grovers Avenue), has frontage along a local street to the north (Villa Rita Drive) and there is pedestrian and bike access along the west side of the school (40th Avenue).

The neighborhood around the school was developed with sidewalks along both sides of all streets, providing good walking and bicycle access to the school. There are separate bus and parent loading/drop-off areas, and parents are provided ample on-site queuing areas for pick-up to prevent backing onto the street. Crossing guards are provided at the all-way STOP-controlled intersection of 39th Avenue and Grovers Avenue, and there are guards at the 15 mile-per-hour zone crossing Grovers Avenue at 41st Avenue (west of the school) and crossing 39th Avenue at Villa Rita at the north end of the school. Children do not cross either collector street without the assistance of an adult crossing guard.

Christa McAuliffe Elementary School is another example of a good school site and campus layout that is very walkable (see Figure 4), despite the fact that it has frontage onto only one street. The school, which opened in 1987, fronts onto a collector street (W 83rd Street) near the center of the attendance boundary. In addition to a good sidewalk network, a network of paths is internal to the neighborhood and provides direct access to the school and a nearby community center immediately west of the school.

Although McAuliffe School fronts directly only onto one street, the community center immediately west of the school provides for satellite parking and pick-up/drop-off activities, removing much of the traffic congestion from the school frontage. Many children use the internal neighborhood paths to avoid street crossings.

EXAMPLE OF A GOOD SCHOOL RETROFIT

Not all schools were built in the center of a neighborhood, and not all neighborhoods have a good grid pattern to accommodate school sites. Moon Mountain Elementary School was built along an arterial street (19th Avenue) in northwest Phoenix (see Figure 5). When the school opened in 1970, the school fronted directly onto 19th Avenue, which provided the only vehicle access onto the school campus.

When the school was originally built, the arterial street was only two lanes wide and the traffic volumes were reasonably low. Over the years, 19th Avenue was widened to six lanes and 68 feet wide (20.7 meters), with nearly 40,000 average daily traffic. Not only did many children have to cross a wide, busy arterial street, all the parent traffic was focused onto the same small school frontage and conflicted with the school crossing. City staff was called out to the school on an annual basis in an attempt to solve the nearly unsolvable traffic problems.

In 1999, the school campus was rebuilt on the same site, but the school building and access were focused to the interior of the neighborhood and fronted onto a local street within the neighborhood (Voltaire Avenue). Speed humps were installed along the local street that fronted the school, and a larger parent pick-up/drop-off area was constructed that did not back out onto an arterial street.

School traffic no longer conflicts with the school crossing across 19th Avenue, which operates with two adult crossing guards who operate a 15 mph school zone. A pick-up and drop-off plan was implemented along with a Safest Route to School Walking plan. Buses load from a local street on the south side of the school, totally separate from parent and other school traffic.

There have been virtually no traffic complaints from school officials or parents since the school campus was rebuilt to front into the neighborhood. This is despite the fact that the school was rebuilt on the same site.

ORGANIZATION OF ITE SCHOOL SITE PLANNING, DESIGN AND TRANSPORTATION REPORT

Committee work on the report is underway. The outline of the report is expected to be organized as follows:

- Foreword
  - Scope
  - Technical Committee
  - Intended Users
  - National Safe Routes to School Legislation
  - Terms and Definitions
- Purpose and Overview
  - Purpose
  - Major Issues at Schools
  - Modifying Parent and Student Behavior
  - Influence Public Policy
- School Size and Property Requirements
- Characteristics and Needs of Schools
  - School Catchment Areas/ Attendance Boundaries
  - Bus Activity
  - Parent Pick-Up and Drop-Off Needs
  - Public Transit
  - Parking Demands
- Street Layout and Neighborhood Connectivity
  - Location within Neighborhood and Road Network
  - Minimum Frontage Requirements
  - Vulnerable Users
  - Vehicle Access
- School Campus Design and Physical Site Layout
  - Sidewalk and Vehicle Connections
  - Emergency Access
  - Bus Loading and Circulation
  - Parent Pick-Up and Drop-Off Zones
  - Parking Layout and Access
  - Lighting
  - Location of Athletic Fields
  - Campus Security
- School Area Traffic Control
- Special School Events
- Methods to Minimize Peak School Traffic Congestion
- Guidelines for Redevelopment of A School Campus
- References

LOW-COST LOCATION, DESIGN AND CONSTRUCTION OF A SCHOOL WITH INADEQUATE INFRASTRUCTURE CAN RESULT IN A LIFETIME OF HIGHER COSTS TO OVERCOME BUILT-IN TRAFFIC SAFETY AND OPERATIONAL PROBLEMS.

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COMMITTEE TIMETABLE AND FUTURE WORK

ITE Technical Committee TENC-105-01 intends to complete compiling a series of guidelines and best practices in 2007 and will submit these guidelines to ITE, practitioners and school officials for review and input. The committee is currently seeking further input and guidelines along with examples of good school sites. If you have any guidance to contribute or if you wish to participate in the development or review of guidelines, please contact Michael J. Cynecki, P.E., Traffic Engineering Supervisor, Street Transportation Department, Phoenix, AZ 85003 or Russell G. Brownlee, P.Eng., Associate, IBI Group, Toronto, ON M5B 1Y6, Canada. ■

References

1. Transportation Characteristics of School Children. Report No. 4, Nationwide Personal Transportation Study, Washington, DC, USA: Federal Highway Administration (FHWA), July 1972.

2. Data from the 2001 National Household Travel Survey conducted by FHWA.

3. Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. (Public Law 109-59, Section 1404).

4. U.S. Department of Education, National Center for Education Statistics, Common Core of Data Survey, Table 94—Public elementary and secondary schools, by type and size of school: 2000-01. Prepared July 2002.

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